

NAVAL POSTGRADUATE SCHOOL
Monterey, California

EC 3210

MIDTERM EXAM II

11/92 Po

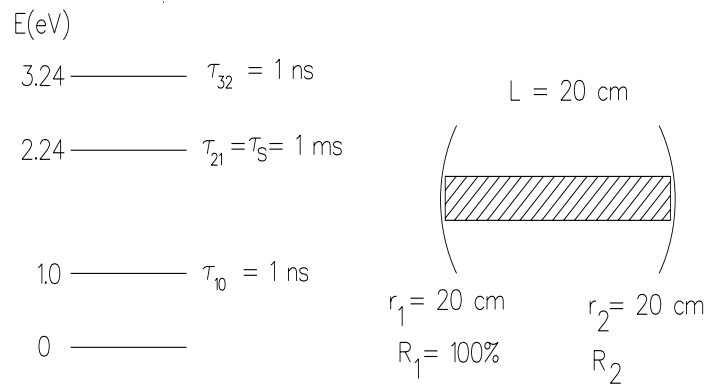
- This exam is open book and notes.
- There are three problems; each is equally weighted.
- Partial credit will be given; be sure to do some work on each problem.
- Be sure to include units in your answers.
- Please circle or underline your answers.
- Do *NOT* do any work on this sheet.
- Show *ALL* work.
- Enter your name in the space provided.

1	
2	
3	
Total	

Name: _____

1. A Gaussian beam with a spot size of 1.2 mm and a radius of phase curvature of 30 cm is incident (from the left) on a lens with a 10 cm focal length. The wavelength of the light is 1 μm . Calculate the beam spot size at the back focal plane of the lens (i.e., a distance of 10 cm to the right of the lens).

2. A lasing material, having the energy diagram shown below, is placed into a resonator as shown. The material is lifetime broadened; the internal losses of the material are 0.05 m^{-1} . Experimentation shows that the optimum transmissivity of the output mirror is 98%. Find the value of $(N_2 - N_1)_0/\text{Vol}$. (**Added information: You need a value of n to solve this problem; assume $n=1$.**)



3. Consider the optical resonator shown. For what values of r_1 will the resonator be stable?

